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Ethnobotanical and Medicinal Uses of Some Wild Edible Fruiting Plants in District Tehri Garhwal (Western Himalaya), Uttarakhand

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Abstract: The present study was conducted to explore ethnomedicinal uses of different wild edible fruiting plants by inhabitants in district Tehri Garhwal (Uttarakhand). Study was carried out in District Tehri Garhwal, and twenty-four wild fruits *viz*; *Aegle marmelos, Benthamidia capitata, Berberis aristata, Berberis lyceum, Carissa opaca, Celtis australis, Embilica officinalis, Ficus auriculata, Ficus palmate, Ficus racemosa, Ficus semicordata, Flacourtia indica, Grewia optiva, Morus serrata, Myrica esculenta, Phoenix humilis, Punica granatum, Pyrus pashia, Rhus parviflora, Rubus ellipticus, Rubus paniculatus*, *Solanum nigrum, Syzygium cumini,* and *Ziziphus glaberrima* were identified from study area and their ethnomedical uses have been noticed.
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Introduction

Garhwal Himalayan region is rich in diversity of wild plant species and it plays a significant role in the life of human kind (Gaur RD, 1999). Wild edible plants are very important for the well being of rural peoples in the hilly regions, not only as sources of supplementary food, nutritionally balanced diets, medicines, fiber, fodder and fuel, it also as source for their income generating potential (Gangwar et al., 2010). Fruits are also the important part of balance diet and its regular uses can increase the immune system of man. Wild edible fruits are easily available free of cost in every season to the local inhabitants in hilly areas of Garhwal Himalayas. Uttarakhand is highly enriched with its vegetation including wild edible fruits due to its varied eco-geographical and eco-climatic conditions (S Saklani, S Chandra, 2011). Some wild fruits have been identified to have their better nutritional value than cultivated fruits (Eromosele et al., 1991; Maikhuri et al., 1994). Consumption of wild edible fruits meets proteins, carbohydrates, fats, vitamins and minerals requirement of poor rural peoples in hilly areas of Uttarakhand (Sundriyal and Sundriyal, 2001). Peoples who do not have earning sources in hills, they wait for ripening time as it carries a lot of commercial importance. The popularity of the species can be judged from the fact that local people of the hills can earn more money in every season from selling of the wild fruits (Bhatt et al., 2000). Even millions of people in many developing countries do not have enough food to meet their daily requirements and are deficient in one or more nutrients (FAO, 2004) and in many others developing countries, wild plants are exploited as sources of food and other life supporting commodities and thus provide an adequate level of nutrition to the human beings (Aberoumand and Deokule, 2010). The present study focused on ethnobotanical and medicinal uses of wild edible fruiting plants in district Tehri Garhwal.

Materials and methods

District Tehri Garhwal has been selected for the present investigation. There are nine blocks in district Tehri Garhwal. Five villages from each block were selected. The availability of wild fruits, the area was divided into three regions i.e. tropical, subtropical and temperate. Total forty-five villages were surveyed in different seasons. Main data collection centre was made in New Tehri town (District head quarter) and local information station was made in each selected villages for current information. Each selected villages and identified areas was visited over the year in different seasons with the help of villagers. Observation and information about wild fruits and their useful aspect collected was from the villagers. Information station has contacted regularly to know the availability of the wild edible fruits. The ethno

medicinal property of each identified wild fruits was obtained through informed consent semi-structured interviews, questionnaires, market survey, group conversation, unceremonious dialogue and village walks with key informants. Cultural significance of all identified plants was calculated based on the use as reported by participants at each study site. Different parameters i.e. medicinal value, ethno botanical uses and morphological features of all observed wild fruiting plants have been noticed.

Results and Discussion

Various wild edible fruits are consumed by the local inhabitants in different parts of district Tehri Garhwal. Fruiting plants grow abundantly across an altitudinal gradient in hilly region of Garhwal Himalayas and maximum plants bear fruits during summer and winter. The wild edible fruits are excellent source of vitamins, proteins, carbohydrates, minerals and fibers and enormous ethno medicinal values. In all over the world there are hundreds of wild fruits species are used and these wild fruits plays a significant role in the life of poor peoples. A total twenty-four wild fruiting plants were identified in the study. The ethno medicinal uses and properties of each identified fruiting plants is presented in Table-1.

Table 1- Ethnobotanical and medicinal uses of some wild edible fruiting plants.

S.N.	Botanical Name	Vernacular Name	Family	Ethnobotanical and Medicinal uses
1	*Aegle marmelos* (L.)	Bel	Rutaceae	Fruit edible. Juice making from fruit and used for digestive, cardiac and respiratory disorder. Leaves commonly known as belpatri and offered in shivalaya temple.
2	*Benthamidia capitata* (Wall. Ex. R.)	Bhamora	Cornaceae	Ripe fruit edible, rich source of calcium. Wood used to make agricultural implements.
3	*Berberis aristata* (DC. Syst.)	Kingor	Berberidaceae	Fruit edible, bark and root extract used in jaundice, diabetes and fever. Root extract used in eye flue. Yellow dye obtained from bark.
4	*Berberis lyceum* (Royl. Tr.)	Kingor	Berberidaceae	Fruit edible, bark and root extract used in jaundice, diabetes and fever. Root extract used in eye flue. Yellow dye obtained from bark.
5	*Carissa opaca* (Stapf ex. Hai.)	Karaunda	Apocynaceae	Fruit edible, fruits with Tungla laeves chewed as pepper, Leaves browsed by goats and sheep, wood used as fuel.
6	*Celtis australis* (L. Sp. Pl.)	Kharik	Ulmaceae	Fodder, wood used as fuel and making small agricultural implements, bark source of yellow dye, and its paste applied for bones fracture.
7	*Embilica officinalis* (Gaert. Fru. Sem.)	Awnla	Euphorbiaceae	Fruit edible, used as pickle, fruit rich source of vitamin C, ingredient of Trifala, commonly used for several disorders. Leaves fodder and bark are rich source of tannin,
8	*Ficus auriculata* (L. Fl. Coch.)	Timla	Moraceae,	Leaves fodder, cup and plates are made from leaves, ripe fruits edible, unripe fruits made into vegetable after toast.
9	*Ficus palmate* (For. Fl. Aeg.)	Bedu	Moraceae,	Leaves fodder, fruit edible and unripe fruit often used as vegetable after fried. Fruit used for digestive disorder. Plants useful in agro forestry.
10	*Ficus racemosa* (L. Sp. Pl.)	Umra	Moraceae,	Fruit edible. Immature fruit cooked and fried. Leaves used as fodder, plant useful in Hindu religious.
11	*Ficus semicordata* (Buch. Ham. Ex.JE)	Khaina	Moraceae,	Fruit edible, wood used as fuel and leaves fodder.
12	*Flacourtia indica* (Burm. F.)	Kangu	Flacourtiaceae	Leaves fodder, fruit edible and used in hepatitis fever, dysentery, diarrhea. Leaves and bark paste applied on wounds.
13	*Grewia optiva* (J.R.	Bhimal	Tiliaceae	Fruit edible, leaves used as fodder, sticks fiber used as

	Dru. Ex Bu.)			soap and shampoo, sticks lit fire. Ropes, nets, brushes, brooms and cattle tie ropes making from sticks fiber.
14	*Morus serrata* (Roxb. Fl. Ind.)	Sahtoot	Moraceae	Fruit edible, leaves fodder, agricultural implements making from wood.
15	*Myrica esculenta* (Buch. Ham. Ex. Ddun)	Kaphal	Myricaceae	Fruit edible, soup making from fruit and useful in digestive, cardiac and respiratory disorder. Bark used to yield dye. Wood used as fuel and agricultural implements.
16	*Phoenix humilis* (Roy. Il. Bot. H.)	Khajoor	Arecaceae	Fruit edible, leaves used mats, hats and brooms. Dry leaves also used to prepare strong roof of mud houses.
17	*Punica granatum*	Dalimu	Punicaceae	Fruit edible, rich source of minerals and used in cough and cold.
18	*Pyrus pashia* (Buch. Ham. Ex. Ddun)	Mole	Rosaceae	Fruits edible with rich source of minerals. Leaves fodder, wood make into sticks and agricultural implements.
19	*Rhus parviflora* (Rox. Fl. Indica)	Tungula	Anacardiaceae	Fruit edible, leaves mixed with tobacco, and often used as bio-fence. Wood used as fuel, twig used for tooth brush and paste.
20	*Rubus ellipticus* (Smith Res. Cy.)	Hinsar	Rosaceae	Fruit edible. Source of energy. Flower useful in apiculture.
21	*Rubus paniculatus* (Smith Res. Cy.)	Kali Hinsar	Rosaceae	Fruit edible. Flower useful in apiculture.
22	*Solanum nigrum* (L. Sp. Pl.)	Makoi	Solanaceae	Fruit edible and stem extract used in diarrhea, fever. Leaves extract useful in ear pain.
23	*Syzygium cumini* (L. Sk. US Dept. A.B.)	Phalendu	Myrtaceae	Fruit edible, multivitamin, used in diabetes, bark used for dyeing and tannin.
24	*Ziziphus glaberrima* (L. Mill. G. Dict. Ed.)	Ber	Rhamnaceae	Fruit edible and more nutritive, rich source of calcium and potassium, root is useful and applied to old wounds and ulcers. Leaves helpful in liver troubles, asthma and fever.

(Source of data from local inhabitants and Flora of the District Garhwal North West Himalaya)

During survey the growing position of all identified plants were found well in remote areas in comparison to road sides. Development and over exploitation of natural resources are two major factors, which affects the natural habitat of plants in hilly areas of Uttrakhand and are slowly becoming extinct. Wild fruiting plants are major in numbers in that place which are not affected by human interaction due to their difficult geography and climatic conditions which is not suitable for human survival (Tiwari et al., 2010). The morphological features i.e. shape colour, taste, fruiting season and fruits obtained from plant of all observed fruits are discussed in Table-2 and Fig-1.

In hills of Garhwal Himalayas wild fruits are an important source of micro and macro nutrients, which contribute essential nutritional requirements to the rural communities. The wild fruits are natural and pure due to their difficult geography and climatic conditions, and awesome taste of fruits which attracts people as a rich source of their nutrition (Meyers et al., 2003). Poverty is the major contributor to the low consumption of fruits in hilly areas of Uttarakhand but local peoples believe on forest fruits and they consume enough in every season. The use of plant species of the Himalaya as food and medicine have been known for a long time and several economically important plants have been reported from Indian Himalaya (Samant et al., 1998). *Aegle marmelos, Benthamidia capitata, Embilica officinalis, Myrica esculenta, Pyrus pashia* and *Syzygium cumini* are the important sources of many nutrients, including potassium, calcium, fibre, vitamin C and folic acid, which increase the immune system of body. It is rich in polyphenols, minerals and regarded as one of the richest source of vitamin C (Krishnaveni M, Mirunalin S 2011). The wild fruits are do not spoiling immediately due its genetic and physical purity in comparison to cultivated fruits. Local inhabitants store it for long time after harvesting. Bel, Dalimu, Jamun and Bhamora are the common example which stored for long time without refrigerator. Some wild fruits belong to family Ficaceae are juicy with honey and local peoples used it for digestive and respiratory disorder. Such juicy fruits are rich source of minerals and a small amount of Vit.

C and beneficial in the disease of lungs and the gall bladder (Bhowmik et al. (2013). Jamun, Mol, Dalimu and Kaphal are the rich source of different alkaloids, which is eliminating the toxic substances from body. The fruiting plants yields fairly large quantity of alkaloids in which isoquinoline type alkaloids like berberine, palmatine, jetrorrhizine, and columbamine are the most studied phytoconstituents (Dehar et al., 2012). Karonda is also one of the important juicy fruit which helpful in the respiratory disorders. It is a strong purgative and is used as one of the ingredients in some purgative preparations. A large dose of Karonda roots useful for the fatal owing to profuse purging. Parmar C, Kaushal MK (1982).

Table 2- Morphological characters of wild edible fruits species.

S.N.	Botanical Name	Colour	Shape	Fruiting season	Taste
1	*Aegle marmelos*	Pale yellow	Pyriform	Summer	Sweet-sour
2	*Benthamidia capitata*	Dark brown	Round	Winter	Bitter-sweet
3	*Berberis aristata*	Purple	Oblong	Summer	Sweet-sour
4	*Berberis lyceum*	Purple	Oblong	Summer	Sweet-sour
5	*Carissa opaca*	Black	Oval	Summer	Sweet
6	*Celtis australis*	Light red	Oval	Winter	Sweet
7	*Embilica officinalis*	Pale yellow	Round	Winter	Sour
8	*Ficus auriculata*	Red	Pyriform	Summer	Sweet
9	*Ficus palmate*	Purple	Pyriform	Summer	Sweet
10	*Ficus racemosa*	Red	Pyriform	Summer	Sweet
11	*Ficus semicordata*	Red	Pyriform	Summer	Sweet
12	*Flacourtia indica*	Light green yellow	Round	Summer	Sweet
13	*Grewia optiva*	Black	Oblong (4 lobed)	Winter	Bitter-sweet
14	*Morus serrata*	Violet	Oblong	Summer	Sweet-sour
15	*Myrica esculanta*	Red	Round	Summer	Sweet
16	*Phoenix humilis*	Black	Oval	Summer	Sweet
17	*Punica granatum*	Red	Oval	Winter	Sweet-sour
18	*Pyrus pashia*	Black	Round	Winter	Bitter-sweet
19	*Rhus parviflora*	Red yellow	Round flat	Winter	Sweet-sour
20	*Rubus ellipticus*	Yellow	Round	Summer	Sweet
21	*Rubus paniculatus*	Black	Round	Summer	Sweet
22	*Solanum nigrum*	Red	Round	Winter	Sweet
23	*Syzygium cumini*	Purple	Oblong	Summer	Bitter-sweet and sour
24	*Ziziphus glaberrima*	Red	Oval	Winter	Sour-sweet

(Source of data from local inhabitants)

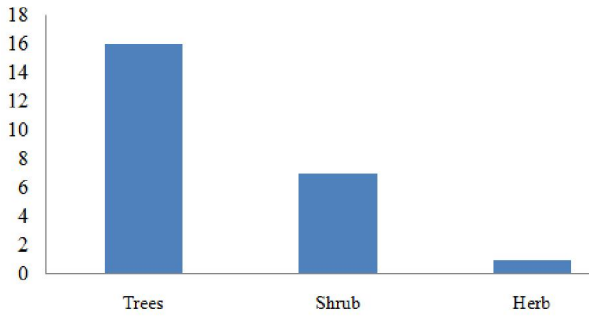

Fig.1. Wild edible fruits obtained from herb, shrub and trees.

Conclusions

Majority of hilly people leave their homes for better education, medical and employment opportunity. The production of different cultivated crops is very low due to climate change and cultivated crops are mainly rain based in the area as such majority of the families are migrating to cities in search of employment. Garhwal Himalayas is the characterized by a rich diversity of ethnobotanical and medicinal plant as well as rich heritage of wild edible fruits. Local inhabitants are using seasonal wild fruits in large scale in every season and earn more money from these fruits. The production of wild fruits is very useful for well being of local peoples, not only as sources of supplementary food, nutritionally balanced diets and medicines as well as for income generating.

But need only to develop the scientific methods regarding conservation, cultivation and using of wild edible fruits, so that local peoples will get benefit from wild fruits and take interest to stay in hills.

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